

REMARKS

In view of the above amendments and the following remarks, reconsideration of the rejections and further examination are requested. Upon entry of this amendment, claims 1, 2, 4 and 7 are amended, and claims 5, 8, 11 and 12 are cancelled, leaving claims 1, 2, 4 and 7 pending with claims 1 and 2 being independent. No new matter has been added.

Objections to the Claims

Claims 5, 8, 11 and 12 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.

Applicants respectfully request that this objection be withdrawn since claims 5, 8, 11 and 12 have been cancelled.

Rejections Under 35 U.S.C. §112, second paragraph

Claims 1-12 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Specifically, the Examiner states that claim 1 recites the limitation “a torsional angle” but does not recite where in relation to the previously recited claim elements, the angle is measured. Additionally, claims 1 and 2 recite the limitation “input torque” but do not recite where in relation to the previously recited claim elements, the torque is applied. Claim 2 recites the limitation “a torsional rigidity” but does not recite where in relation to the previously recited claim elements, the rigidity is measured. The Examiner also states that it is unclear how the last two paragraphs in each of claims 1 and 2 is intended to further define the claimed invention.

Claims 1 and 2 have been amended to overcome this rejection. In particular, claims 1 and 2 have been amended such that the terms “torsional angle”, “input torque” and “a torsional rigidity” are now tied to specific elements recited in the claims.

Additionally, claims 1 and 2 have been amended to clarify how the last two paragraphs in each of claims 1 and 2 further define the claimed invention.

Therefore, Applicants request that this rejection be withdrawn.

Rejections Under 35 U.S.C. §103(a)

Claims 1, 2, 4, 5, 7, 8, 11 and 12 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamazaki et al (US 2003/0083135, hereinafter “Yamazaki”).

Applicants submit that the claims as now pending are allowable over the cited prior art. In particular, amended independent claim 1 now recites a steering system for a vehicle, comprising an inner joint member of a constant velocity joint connected to a steering shaft, wherein a torsional angle of the constant velocity joint in a torque-torsional angle diagram is approximately 0 at the time an input torque of 0 Nm is applied to the steering shaft and to the inner joint member, and wherein the constant velocity joint is configured such that a rotational direction phase having a bending direction of the shaft so as to be aligned with one ball groove of the ball grooves coincides with a steering wheel rotational phase of the vehicle such that the vehicle is in a straight travel state, as recited in independent claim 1 of the present application.

Such a configuration avoids degradation of the steering stability. See Fig. 7 and pg. 10, line 25-pg. 11, line 7 of the original specification. Additionally, as discussed on page 11 of the original specification, in some constant velocity joint configurations, the bending direction of the shaft extends between the ball groove directions, which results in a large hysteresis. Therefore, having the structure and configuration recited in independent claim 1 is advantageous over other configurations.

The cited prior art fails to disclose or render obvious such a system. In particular, Yamazaki discloses a fixed constant velocity joint that can be used with a steering apparatus. See Fig. 13 and paragraphs [0046] and [0047] of Yamazaki. However, Yamazaki fails to disclose a constant velocity joint that is configured such that a rotational direction phase having a bending direction of the shaft so as to be aligned with one ball groove of the ball grooves coincides with a steering wheel rotational phase of the vehicle such that the vehicle is in a straight travel state, as recited in independent claim 1. However, it appears that the Examiner has not given this element patentable weight, stating that the Applicant has failed to explain what prevents the constant velocity joint in Yamazaki from being attached in the manner recited.

Applicants submit that the Applicants are not required to explain what prevents the constant velocity joint in Yamazaki from being attached to the shaft in the manner recited, since the Examiner has not satisfied the PTOs burden regarding why claim 1 is obvious in view of Yamazaki. That is, the Examiner must explain why the invention would have been obvious to a

person of ordinary skill at the time of the invention. The Examiner has provided no evidence that this element is disclosed (explicitly or inherently) by Yamazaki nor has the Examiner provided any rational as to why one of ordinary skill in the art would have modified Yamazaki such that the constant velocity joint would have been configured such that a rotational direction phase having a bending direction of the shaft so as to be aligned with one ball groove of the ball grooves coincides with a steering wheel rotational phase of the vehicle such that the vehicle is in a straight travel state.

Additionally, Yamazaki fails to disclose that a torsional angle of the constant velocity joint in a torque-torsional angle diagram is approximately 0 at the time an input torque of 0 Nm is applied to the steering shaft and to the inner joint member. The Examiner suggests that such a claim element is merely discovering the optimum or workable ranges, which involves only routine skill in the art. Applicants respectfully disagree and submit that a particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of the variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). The Examiner has not set forth any evidence that one of ordinary skill in the art would recognize that it was routine in the art to determine the torsional angle of the constant velocity joint in a torque-torsional angle diagram at the time input torque is applied to the steering shaft and to the inner joint member. Therefore, Applicants submit that the Examiner has not provided sufficient reasoning as to why for one of ordinary skill in the art would have been motivated to reach the claimed torsional angle at the time the claimed input torque is applied.

Therefore, Applicants submit that independent claim 1 and its dependent claims are allowable over the cited prior art.

Applicants submit that independent claim 2 is allowable for similar reasons. Namely, the cited prior art fails to disclose or render obvious, a steering system for a vehicle, comprising a constant velocity joint that is configured such that a rotational direction phase having a bending direction of a steering shaft so as to be aligned with one ball groove of the ball grooves coincides with a steering wheel rotational phase of the vehicle such that the vehicle is in a straight travel state, as recited in claim 2.

Additionally, Applicants submit that the Examiner has not set forth any evidence that one of ordinary skill in the art would recognize that it was routine in the art to determine torsional

rigidity of the constant velocity joint in the vicinity of input torque applied to the steering shaft and to the inner joint member in a torque-torsional angle diagram.

Therefore, Applicants submit that independent claim 2 and its dependent claims are allowable over the cited prior art.

Conclusion

In view of the foregoing amendments and remarks, all of the claims now pending in this application are believed to be in condition for allowance. Reconsideration and favorable action are respectfully solicited.

Should the Examiner believe there are any remaining issues that must be resolved before this application can be allowed, it is respectfully requested that the Examiner contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

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June 25, 2010